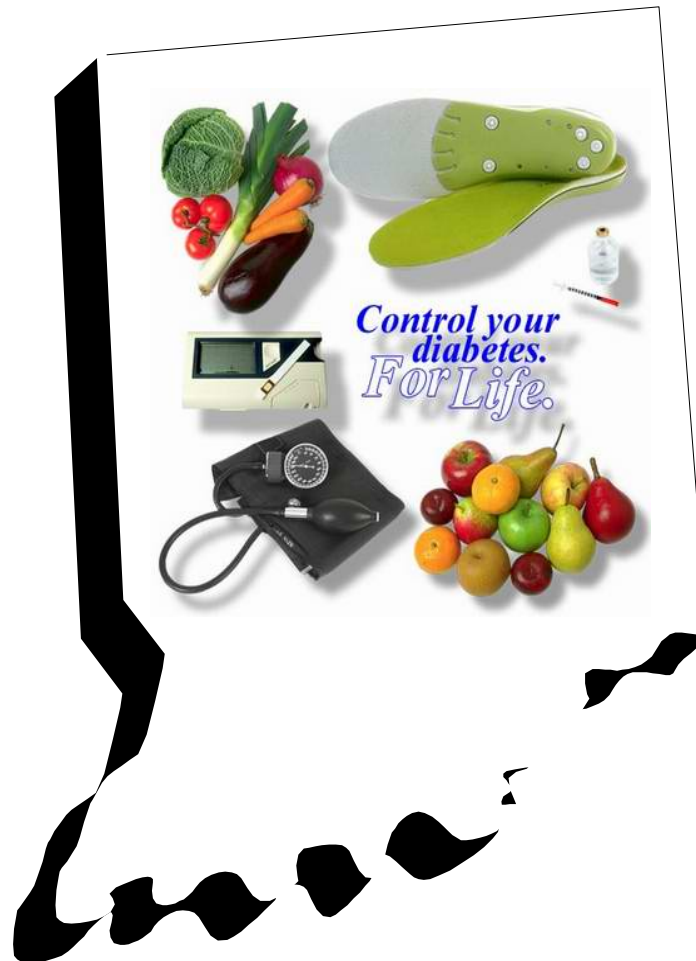


# The Burden of Diabetes in Indiana



**Indiana State Department of Health  
Diabetes Prevention and Control Program**

The Indiana State Department of Health thanks the members of the Diabetes Advisory Sub-Committee of the Chronic Disease Advisory Council for their dedication in directing this effort and other contributors for their commitment. Without their volunteered time and energy, none of this would be possible.

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# Executive Summary

Diabetes presents an ever-increasing financial and social burden to both developed and developing nations that will require increasing and thoughtful allocation of resources for its prevention, detection and treatment. In order to begin this process, we need accurate and timely information about the numbers of people with diabetes and their social and demographic distribution. This document is designed to provide such information. It is based upon both published national data and state data both obtained from the Center for Disease Control and Prevention's (CDC's) ongoing surveys.

It is important to note both the current burden of diabetes and the likely trends of that burden over the next few years. Briefly, the burden is rapidly increasing and the rate of increase is accelerating. There are three interactive reasons for this dramatic increase. First, we have an aging population and diabetes prevalence increase with age so that by the seventh decade of life almost 20 percent of people have diabetes. Additionally, people with diabetes are living longer with the disease causing the age-related prevalence to increase. The second reason for the increasing burden is the increase in the populations at greater risk for the development of diabetes. In Indiana that increase is seen most dramatically among the Latino population. Finally, the two predominant environmental factors associated with diabetes, obesity and sedentary lifestyles, are increasing at a rapid pace. Thus, we can predict with statistical certainty that diabetes will continue to be an increasing burden to our society and to our health care system for the foreseeable future.

In Indiana over 61 percent of adults in Indiana were either overweight or obese in 2002. Nearly 25 percent of Hoosiers were obese in 2002, and another 37 percent were overweight. In 2001, Indiana ranked among the top 10 states in prevalence of obesity. Moreover, obesity is occurring at an earlier age. In Indiana in 2002 36 percent of boys and 32 percent of girls were overweight by the 11<sup>th</sup> grade and 22 percent and 15 percent, respectively were obese. This increase in childhood obesity is now being accompanied by a rapid increase in type 2 diabetes in children and adolescents. Twenty years ago, type 2 diabetes was a disease of the middle and late years of life. Now among some populations it is almost as common as the typical type of childhood diabetes, type 1.

In diabetes prevalence, Indiana is above the national average. The overall prevalence of diabetes in Indiana is 7.4 percent versus a national average of 6.7 percent and both men and women are above the national average. Diabetes, of course, is a serious disease because of its long-term cardiovascular complications. It is a leading cause of blindness, kidney disease and

amputations. In Indiana diabetes is the cause of nearly 40 percent of end stage renal disease. There are 22,000 Hoosiers over 40 who are blind from diabetes. There was an average of over 1,700 amputations performed annually in Indiana in the two-year period 1999-2000. While these statistics are disturbing and represent a great burden of both medical expenses and human suffering, it is the increase in heart disease and strokes that result in the greatest expense and the largest percentages of deaths. Fifteen per cent of Hoosiers with diabetes reported having heart disease and 9 percent had had a stroke. Diabetes contributes to over 5,000 deaths in Indiana each year.

Unfortunately diabetes does not strike equally among all populations. Not only are African Americans and Latinos much more likely to have diabetes, they also are more likely to develop its complications and to die from the disease at an earlier age. Diabetes is also more common as one moves down the social economic scale. That is, the poorer you are or the less educated you are, the more likely you are to develop diabetes. The medical expenses for diabetes average \$13,243 annually, more than five times the medical costs of persons without the disease. Assuming that the average Hoosier with diabetes has similar medical costs, the 338,000 people with diabetes in Indiana had a total medical cost of nearly 4.5 billion dollars in 2002.

There is, however, a great deal of good news associated with diabetes. First and foremost, the complications of diabetes are not inevitable. There is now conclusive proof that controlling diabetes will reduce its specific complications by from 60-75 percent. Moreover, controlling diabetes and the other cardiovascular risk factors such as abnormal blood fats and high blood pressure can prevent heart attacks and strokes. The challenge for all of us is to identify and effectively treat everyone with diabetes before they develop its complications. Today one in three people with diabetes are undiagnosed and, therefore, untreated.

Perhaps in the long run the prevention of diabetes itself is the best strategy. There is now conclusive evidence that diabetes can be prevented or significantly delayed in those with a high risk for developing diabetes by modest weight loss (between 10 and 14 pounds in a 200 pound person) and exercise (walking 30 minutes five days a week). Here there are two challenges: first to develop a strategy to identify those at the highest risk for developing diabetes and second to put in place programs to help them achieve their weight loss and exercise goals.

These and other strategies, along with realistic benchmarks toward their achievement, are contained in the document "A Plan to Control and Prevent Diabetes in Indiana" that accompanies the burden monograph.

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# Background

Diabetes is a serious, costly and growing public health problem. In the United States, 1.3 million people are diagnosed with diabetes each year. The Centers for Disease Control and Prevention (CDC) estimate that 6.3 percent of the population of the United States currently has been diagnosed with diabetes. For the year 2002, they estimated that 18.2 million Americans of all ages had diabetes. While 13 million of these people had been diagnosed with diabetes, 5.2 million had not been diagnosed and were unaware they had the disease. An additional 20 million American adults between the ages of 40 and 74 are estimated to have a condition known as pre-diabetes, placing them at high risk of developing diabetes.

**18.2 million  
Americans  
have  
diabetes.**

In 2002, the total cost of diabetes in the United States was estimated at \$132 billion. Direct medical costs (physicians' fees, hospital charges, home health care) were \$92 billion and indirect costs (disability, work loss, premature mortality) were \$40.2 billion. The average yearly health care cost of a person with diabetes was \$13,243 in 2002, while the cost for a person without diabetes was \$2,560.

- ◆ The number of adults in the US who have been diagnosed with diabetes (including women diagnosed only during pregnancy) has increased 61 percent since 1991 and is projected to more than double by the year 2050.
- ◆ Diabetes has its greatest effects in women, the elderly and certain racial and ethnic groups.
- ◆ One in five American adults over the age of 65 has diabetes.
- ◆ African American, Native American and Hispanic adults are more than twice as likely to have diabetes as white adults.

**5.2 million  
Americans have  
diabetes but  
don't know it.**



# About Diabetes

Diabetes mellitus is a group of diseases characterized by high levels of blood glucose (blood sugar). These high levels of blood glucose result when the body either does not produce enough insulin or cannot properly use the insulin it makes. Insulin is necessary for the body's regulation of blood glucose levels. It is a hormone produced in the pancreas and needed by the body to convert sugars, starches and other foods into energy. When diabetes is not controlled, glucose and fats remain in the blood and, over time, damage vital organs. The build-up of glucose in the blood is called hyperglycemia.

## Symptoms of Diabetes

**Frequent urination**  
**Extreme thirst**  
**Extreme hunger**  
**Unusual weight loss**  
**Increased tiredness**  
**Irritability**  
**Blurred vision**  
**Numbness and tingling in the hands and feet**  
**Slow healing of cuts and bruises**

## Types of Diabetes

**Type 1 diabetes** was formerly called juvenile-onset diabetes or insulin-dependent diabetes. Type 1 diabetes usually strikes children and young adults and accounts for about 5 percent to 10 percent of all diagnosed cases of diabetes. Type 1 diabetes develops when the body's immune system destroys the cells in the pancreas that make the hormone insulin. People with type 1 diabetes must take insulin daily through injections or an insulin pump to survive, since their bodies produce little or no insulin. The symptoms of type 1 diabetes are severe and the onset is rapid, so type 1 diabetes is usually diagnosed within a short time. Risk factors for type 1 diabetes include autoimmune, genetic and environmental factors.

### Risk Factors for Type 2 Diabetes

**Obesity**  
**Age > 45**  
**One or both parents with diabetes**  
**Member of at-risk ethnic group**  
**Gestational diabetes (or gave birth to a child > 9 pounds)**  
**Hypertension**  
**High triglyceride levels**  
**Low HDL cholesterol levels**

**Type 2 diabetes** was formerly called adult-onset diabetes or non-insulin-dependent diabetes. It is the most common form of diabetes and accounts for about 90-95 percent of all diagnosed cases. Type 2 diabetes usually begins as insulin resistance, a condition in which the cells cannot use insulin efficiently. Many people with type 2 diabetes can control their blood

glucose by following a careful diet and exercise program.

Type 2 diabetes develops most often in middle-aged and older adults, and has typically been associated with obesity, family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity and race/ethnicity. Type 2 diabetes is increasingly being diagnosed in children and adolescents, presumably because of more sedentary lifestyles and increased rates of obesity, which increase the risk of developing the disease earlier in life.

**Type 2 diabetes  
can be delayed  
or prevented  
with diet and  
exercise.**

Recent studies have proven that type 2 diabetes can be delayed or prevented when people who are at high risk for diabetes lose 5-7 percent of their body weight and engage in 30 minutes of physical activity 5 days a week.

**Gestational diabetes** is a form of glucose intolerance that occurs in some women during pregnancy. Gestational diabetes develops in 2-5 percent of all pregnancies and occurs more frequently among African Americans, Hispanic/Latina Americans and Native Americans. It is also more common among obese women and women with a family history of diabetes. During pregnancy, treatment is required to normalize maternal blood glucose levels and avoid complications to the infant. After pregnancy, gestational diabetes usually disappears, although 5-10 percent of the women are found to have type 2 diabetes. Women who have had gestational diabetes have a 20 percent to 50 percent chance of developing diabetes in the 5-10 years following the pregnancy.

**Other specific** types of diabetes can result from malnutrition, drugs, infections, specific genetic conditions and other illnesses. These types of diabetes may account for 1-5 percent of all diagnosed cases of diabetes.

**Pre-diabetes** is a relatively new term for a condition in which blood glucose levels are higher than normal, but not high enough for a diagnosis of diabetes. The people who develop type 2 diabetes don't go from having normal blood sugar levels directly to having levels found in diabetes. Almost all people who develop type 2 diabetes first go through a phase of either impaired glucose tolerance or impaired fasting glucose before developing type 2 diabetes.

## Criteria for Diagnosis of Pre-Diabetes

Measure	Diagnosis	Treatment Goals
Fasting Plasma Glucose Test (FPG) - 100-125 mg/dl	Pre-Diabetes - Impaired Fasting Glucose (IFG)	Moderate Physical Activity (e.g. Walking 30 minutes 5x/week) Diet Modification Weight Loss, if overweight, at least 5 - 7 percent of current body weight. Test Glucose Annually.
Oral Glucose Tolerance Test (OGTT) - 140-199 mg/dl (2-hour plasma glucose following a 75-gram oral glucose load)	Pre-Diabetes - Impaired Glucose Tolerance (IGT)	

## Complications of Diabetes

Complications of diabetes are extremely serious and can result in premature death. Complications include heart disease, stroke, blindness, kidney failure, amputations of the leg, foot and toe, as well as deaths related to the flu, pneumonia and complications during pregnancy.

### Heart Disease and Stroke

- ◆ Heart disease is the leading cause of diabetes-related deaths.
- ◆ Adults with diabetes have heart disease death rates about 2 to 4 times higher than adults without diabetes.
- ◆ Smoking doubles the risk of heart disease in people with diabetes.
- ◆ Heart attacks occur at an earlier age in people with diabetes.
- ◆ The risk of stroke is 2 to 4 times higher for people with diabetes.
- ◆ About 65 percent of deaths among

*Anyone 45 years old or older should be tested for diabetes.*

*If you're 45 or older and overweight, it is strongly recommended that you get tested for diabetes.*

*If you're younger than 45, overweight and have one or more risk factors, you should consider getting tested for diabetes.*

people with diabetes are due to heart disease and stroke.

## High blood pressure

- ◆ About 73 percent of adults with diabetes have blood pressure greater than or equal to 130/80 mm Hg or use prescription medications for hypertension.

## Blindness

- ◆ Nationwide, diabetes is the leading cause of new cases of blindness among adults aged 20-74.
- ◆ Diabetic retinopathy is a common complication of diabetes that affects the tiny blood vessels of the retina and can lead to blindness and causes 12,000 to 24,000 new cases of blindness each year.

## Kidney Disease

- ◆ Diabetes is the leading cause of treated end-stage renal disease, accounting for 44 percent of new cases.
- ◆ In 2001, 42,813 people with diabetes began treatment for end-stage renal disease in the US.
- ◆ In 2001, 142,963 people with end-stage renal disease due to diabetes had either received a kidney transplant or required chronic dialysis.

## Nervous System Disease

- ◆ About 60 percent to 70 percent of people with diabetes have mild to severe forms of nervous system damage (neuropathy), resulting in impaired sensation or pain in the feet or hands, slowed passage of food in the stomach, carpal tunnel syndrome and other nerve problems.
- ◆ Severe forms of diabetic neuropathy are a major cause of lower extremity amputations.

## Amputations

- ◆ More than 60 percent of nontraumatic lower-limb amputations in the United States occur among people with diabetes.
- ◆ In 2000 and 2001 there were 82,000 nontraumatic lower-limb amputations annually among people with diabetes.

## Dental Disease

- ◆ Almost one-third of people with diabetes have severe periodontal disease.
- ◆ People with periodontal disease are almost twice as likely to suffer from coronary artery disease as those without periodontal disease. Periodontal disease can also exacerbate existing heart conditions.
- ◆ Young adults with diabetes have twice the risk of periodontal or gum disease than those without diabetes.

## Complications of Pregnancy

- ◆ Poorly controlled diabetes existing prior to conception and during the first trimester of pregnancy can cause major birth defects in 5 percent to 10 percent of pregnancies and spontaneous abortions in 15 percent to 20 percent of pregnancies.
- ◆ Poorly controlled diabetes during the second and third trimesters can result in very large babies, posing risk to both the mother and the child.

## Other Complications

- ◆ Uncontrolled diabetes can often lead to biochemical imbalances that can cause acute life-threatening events, such as diabetic ketoacidosis and hyperosmolar coma.
- ◆ People with diabetes are more susceptible to other illnesses, and often have a worse prognosis than people without diabetes when they become ill.
- ◆ People with diabetes are more likely to die from pneumonia or influenza than people without diabetes.

## Mortality

Diabetes is the sixth leading cause of death in the US. The overall risk for death among people with diabetes is about twice as high as for people without diabetes. Women are at higher risk than men. The relative risk for death is greater for younger people with diabetes and declines with age.

- ◆ The relative risk of death is 3.6 times higher in people with diabetes aged 25-44 than those without diabetes, and 1.5 times higher in people with diabetes aged 65-74 than those without diabetes.
- ◆ The relative risk of death for women with diabetes aged 45-64 is 2.7 times higher for those without diabetes.
- ◆ The relative risk of death for men with diabetes aged 45-64 is 2 times higher than those without diabetes.
- ◆ The relative risk of death is 1.5 times higher in people with diabetes aged 65-74 than those without diabetes.
- ◆ The CDC estimates that in 1999 about 19 percent of all deaths in the United States occurred in people with diabetes aged 25 years and older, a number totaling 450,000.

## Diabetes in Indiana

According to the 2000 US Census, Indiana is the 14th largest state with a population of 6,080,485. Approximately 12.4 percent of the population is 65 and over, which is consistent with the median percentage for the US population. This

**Nearly 338,000 people in Indiana have been diagnosed with diabetes.**

is the age group in which the prevalence of diabetes is highest. It is not unexpected that the oldest age group has the highest prevalence of diabetes, since diabetes is a chronic disease, and people diagnosed with diabetes at any age would still report having diabetes as they get older. If the mortality rate for diabetes goes down, the prevalence rate of diabetes will go up, since those who would have died from the disease are alive to be included in the prevalence rate.

The racial and ethnic composition of Indiana is 87.5 percent white, 8.4 percent black, 3.5 percent Hispanic, 1.0 percent Asian and 0.3 percent American Indian or Alaska Native. Due to the small number of respondents, no reliable statistics can be calculated from the Behavior Risk Factor Surveillance System (BRFSS) survey for the Asian or American Indian or Alaska Native population in Indiana.

The Hispanic population is considered to be at increased risk for developing diabetes. The Hispanic population more than doubled in Indiana from 1990 to 2000, from 98,788 in 1990 to 214,536 in 2000.

- ◆ The population of Indiana in 2002 was estimated to be 6,159,068, with 4,564,211 adults over the age of 18.
- ◆ BRFSS survey data for 2002 estimate the prevalence of diagnosed diabetes in Indiana to be 7.4 percent - which means nearly 338,000 Hoosiers have been diagnosed with diabetes.
- ◆ An additional 182,000 Hoosiers are estimated to have diabetes, but don't know it.

**More than  
180,000  
Hoosiers have  
diabetes but  
don't know it.**

## Prevalence

Based on the national BRFSS estimates for 2002, the prevalence of diagnosed diabetes is 6.7 percent in the United States and 7.4 percent in Indiana. The BRFSS survey is a random-digit dialed telephone survey of non-institutionalized adults 18 and older conducted annually in all states. The survey is administered by the Centers for Disease Control and Prevention (CDC) and is conducted the same way in each state so the data can be used to compare the estimated prevalence of disease from one state to the nation or another state. In 2002, 5,789 people in Indiana responded to the BRFSS survey.

The prevalence of diabetes in Indiana was determined by the percentage of people who answered "yes" to the BRFSS question: "Have you ever been told by a doctor that you have diabetes?". This question provides an estimate of the prevalence of diagnosed diabetes based on respondents who self-report they have been diagnosed with diabetes and are thus "aware" they have the disease. The prevalence estimates from the BRFSS survey do not include the one-third of those with diabetes who have not been diagnosed and are "unaware" they have the disease.



There are some caveats about the prevalence estimates derived from the Indiana BRFSS survey:

- ◆ Although every effort is made to make the survey as accurate and consistent as possible, the survey only collects responses from adults over the age of 18 who are not institutionalized and who have telephones. There may be some difference in prevalence of diabetes between those who have telephones and those who do not.
- ◆ The prevalence from the survey comes from self-reported diagnoses of diabetes. This underestimates the true prevalence of diabetes in Indiana.
- ◆ The BRFSS survey does not contain any information on the prevalence of diabetes in children.
- ◆ The prevalence of diabetes rises with age and is highest in the oldest age group. A higher prevalence in older age groups is not unexpected in a chronic disease, since once diagnosed, a person has the disease for a lifetime. It is worth noting that if the incidence of disease remains the same for a chronic disease but mortality decreases, the prevalence will rise, especially in the oldest age groups, since the people who would have died are still alive to be counted as prevalent cases.
- ◆ Since 1990 the prevalence of diabetes has risen from 4.9 percent to 6.7 percent nationally and from 5.7 percent to 7.4 percent in Indiana.
- ◆ Nationally in 2002, the BRFSS estimated the prevalence of diabetes in adults aged 18 and over to be:
  - 5.9 percent in non-Hispanic whites
  - 10.2 percent in non-Hispanic blacks
  - 6.7 percent in Hispanics
- ◆ In Indiana in 2002, the BRFSS estimated the prevalence of diabetes in adults aged 18 and over to be:
  - 6.9 percent in non-Hispanic whites
  - 14.7 percent in non-Hispanic blacks
  - 5.4 percent in Hispanics

The prevalence of diabetes in the Hispanic population in Indiana is much lower than the national prevalence. The percentage of Hispanic respondents to the BRFSS in Indiana was 3.4 percent, which reflects the percentage of the Hispanic

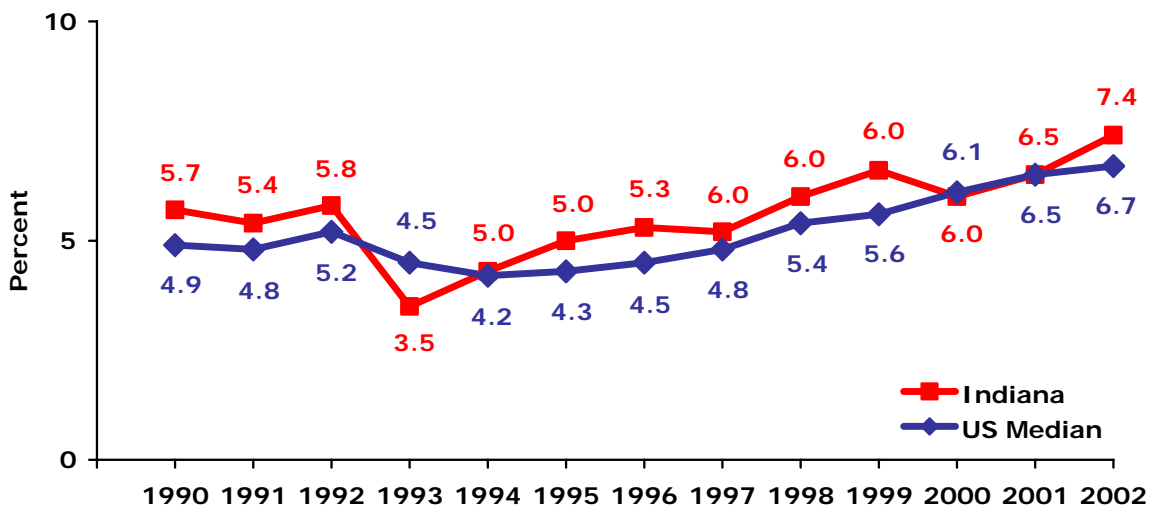


population in Indiana reported by the 2000 Census. However, the Hispanic population more than doubled in Indiana between 1990 and 2000, from 98,788 to more than 214,000. The lower prevalence may result from the fact that the large influx in the Hispanic population is likely comprised of more young adults than the general population, and a younger population would have a lower prevalence of diabetes. If this were true, the prevalence of diabetes would be expected to rise in Indiana over the coming years as this population ages, even if the incidence among the Hispanic population remains the same.

The prevalence of diabetes in the black population in Indiana is much higher than the national rate. The percentage of black respondents to the BRFSS in Indiana was only 4.9 percent, although the percentage of the black population of Indiana was reported to be 8.4 percent by the 2000 Census. It is unclear why this was so. The questions about race and ethnicity have changed and now include multi-racial and other as well as the historic categories of black, white, Asian and other. The prevalence rate of diabetes in the multi-racial and other category in the Indiana BRFSS was 8.1 percent. It is possible there may be differences in the racial categories selected by older black versus younger black people. It may be that older black people are more likely to select only the traditional black category while younger black people are more likely to select other or to select another racial category in addition to black, thus placing them in the multi-racial or other categories. If so, this might account for the lower percentage of black respondents reported in the survey. If this were true, the prevalence for diabetes in blacks in Indiana may appear higher than it actually is if the typical respondents who selected the black only race category were older, because diabetes prevalence increases with age.

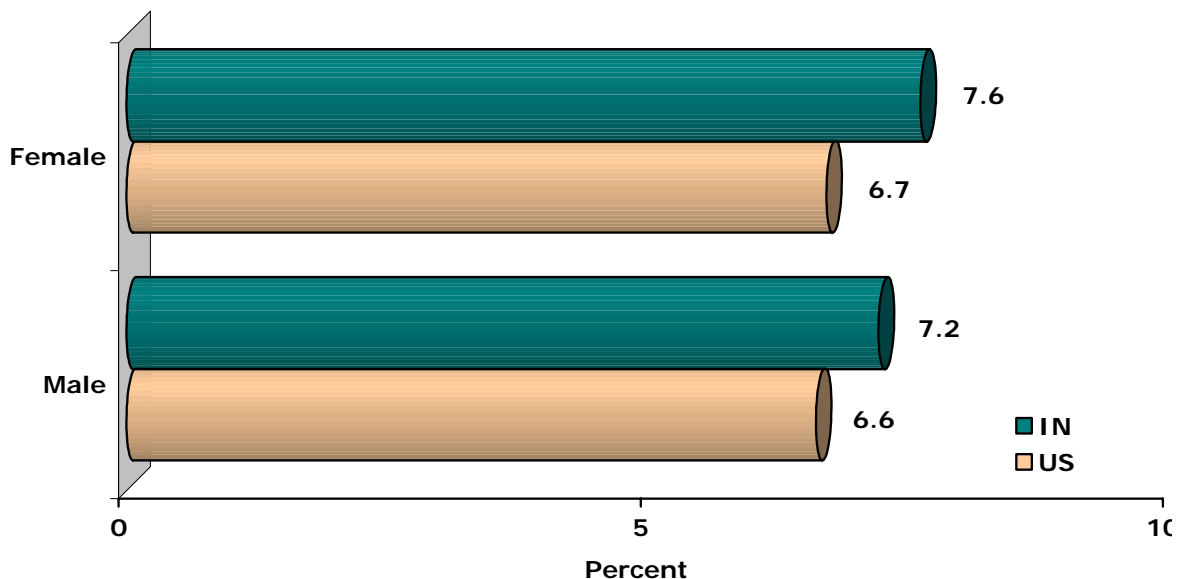
The prevalence of diabetes in Indiana is higher among those with less than a high school education than any other level of educational attainment. Level of educational attainment is one measure of socio-economic status (SES) and the prevalence of diabetes is inversely related to SES, i.e. the lower the SES, the higher the prevalence. While a higher prevalence is not unexpected among those with less than a high school education, the estimated prevalence may be skewed by varying rates of high school graduation rates among the age groups. In Indiana's 2002 BRFSS data, both prevalence and the number of respondents with diabetes increase with age and are highest in the oldest age group, while prevalence and number of respondents are lowest in the youngest age group. Rates of high school graduation have increased dramatically in the past 50 years. Respondents aged 65+ would have graduated from high school earlier than 1960. According to the National Center for Education Statistics, the percentage of persons over age 25 in the United States who had graduated from high school was 41.1 percent in 1960 and 84.1 percent in 2000.

**Figure 1** Self-Reported Prevalence of Diagnosed Diabetes Among Adults Aged 18+ Indiana vs. Nationwide Median 1990 - 2002  
*Source: BRFSS*



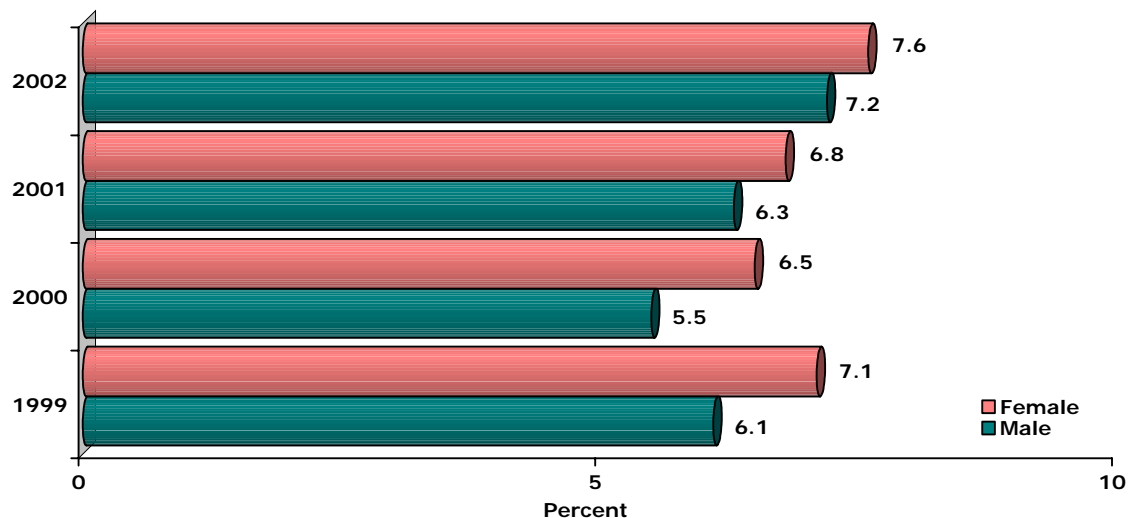
Percentages are weighted to population characteristics.  
 Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 2** Self-Reported Prevalence of Diagnosed Diabetes by Gender Indiana vs. Nationwide Median 2002  
*Source: BRFSS*

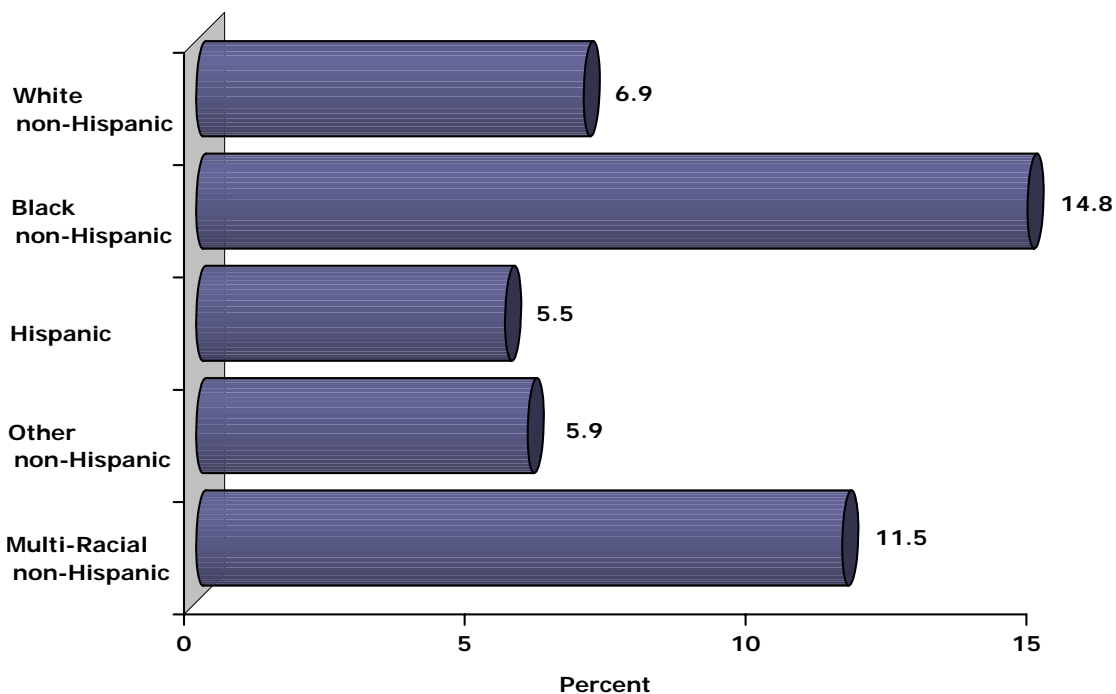


Percentages are weighted to population characteristics.  
 Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

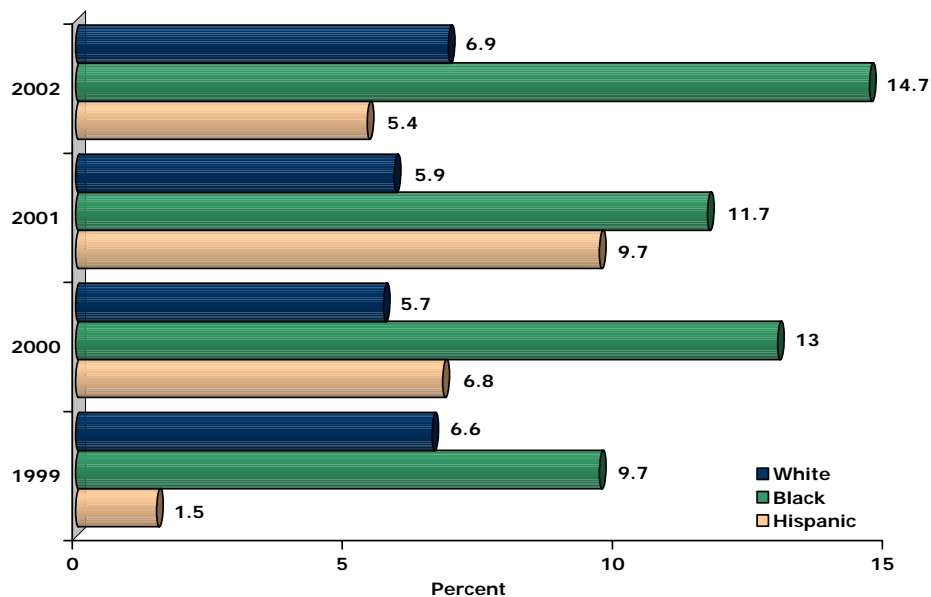
**Figure 3** Self-Reported Prevalence of Diagnosed Diabetes by Gender  
Indiana 1999 - 2002  
*Source: BRFSS*



**Figure 4** Self-Reported Prevalence of Diagnosed Diabetes by Race/Ethnicity  
Indiana 2002  
*Source: BRFSS*

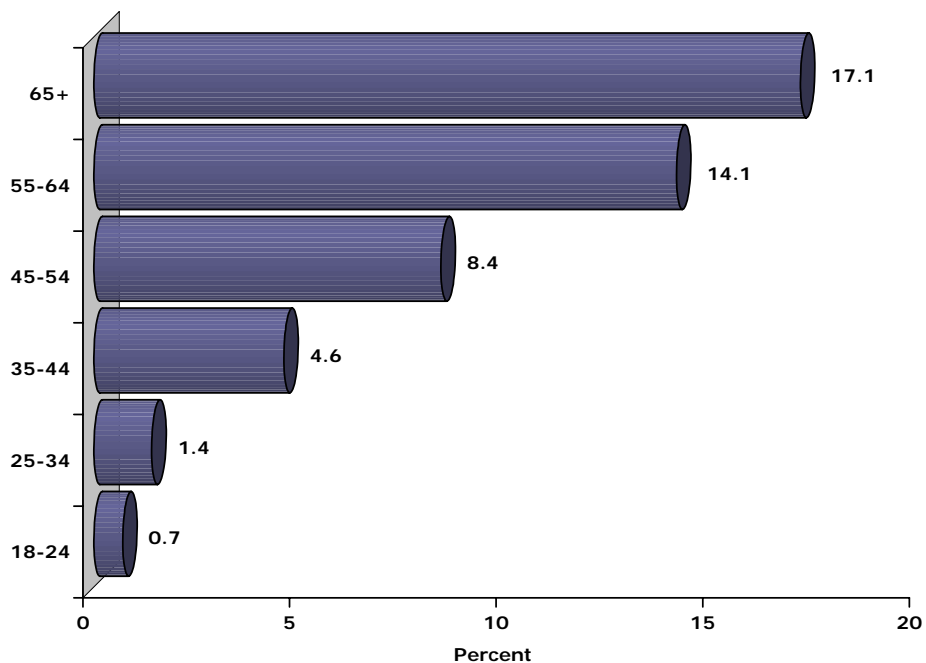


**Figure 5** Self-Reported Prevalence of Diagnosed Diabetes by Race/Ethnicity  
Indiana 1999 - 2002  
*Source: BRFSS*



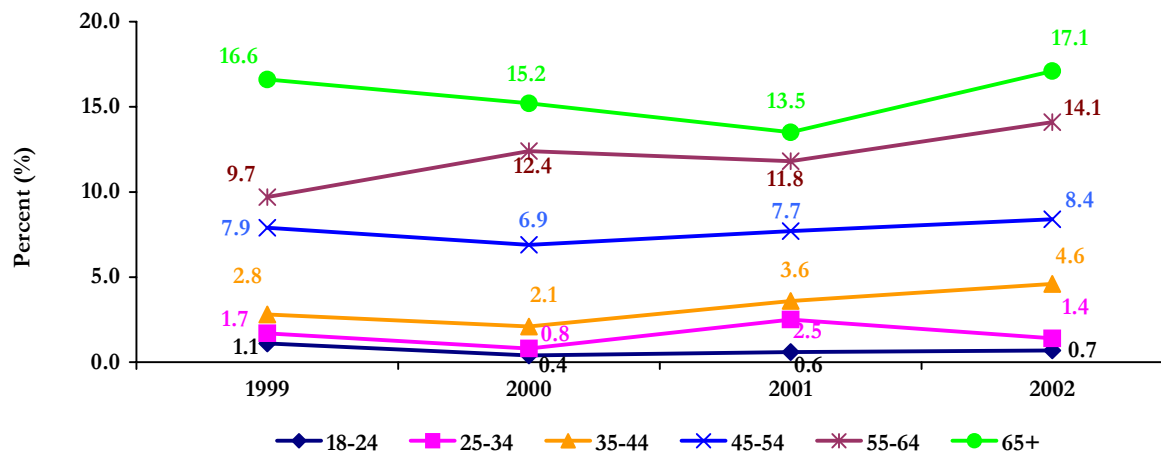
Percentages are weighted to population characteristics.  
Race breakdown: White=White non-Hispanic; Black= Black non-Hispanic; Hispanic  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 6** Self-Reported Prevalence of Diagnosed Diabetes by Age  
Indiana 2002  
*Source: BRFSS*



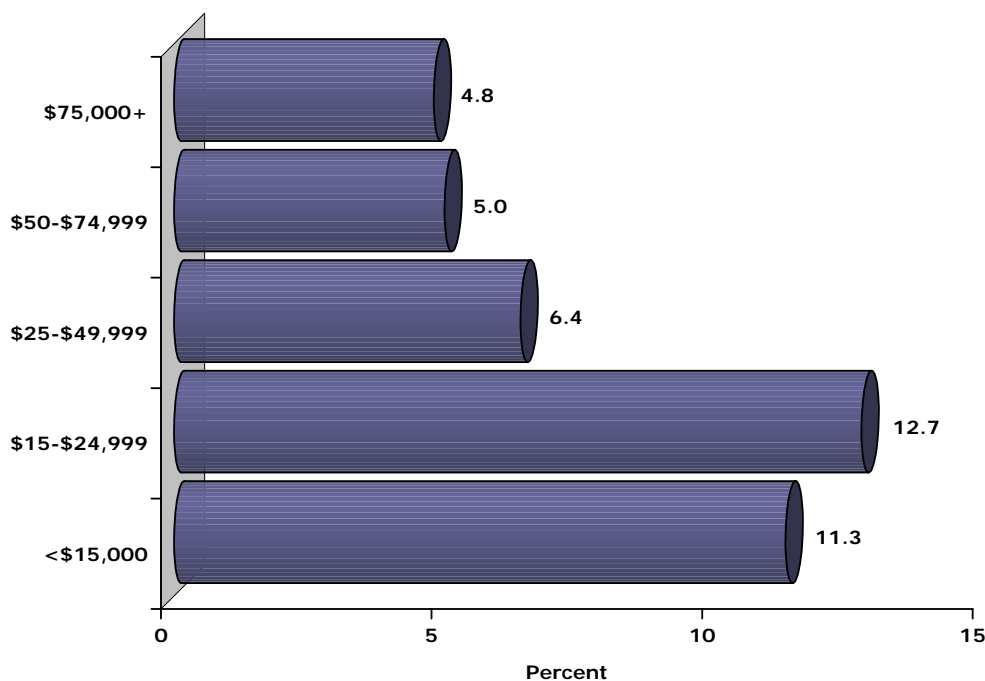
Percentages are weighted to population characteristics.  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 7** Self-Reported Prevalence of Diagnosed Diabetes by Age  
Indiana 1999 - 2002  
Source: BRFSS



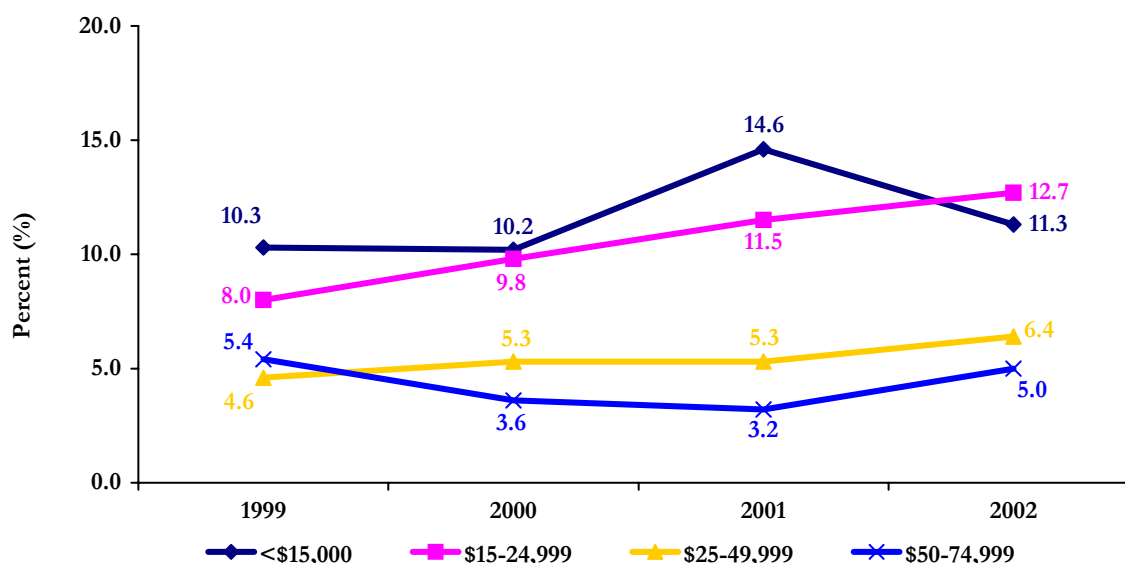
Percentages are weighted to population characteristics.  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 8** Self-Reported Prevalence of Diagnosed Diabetes by Income  
Indiana 2002  
Source: BRFSS



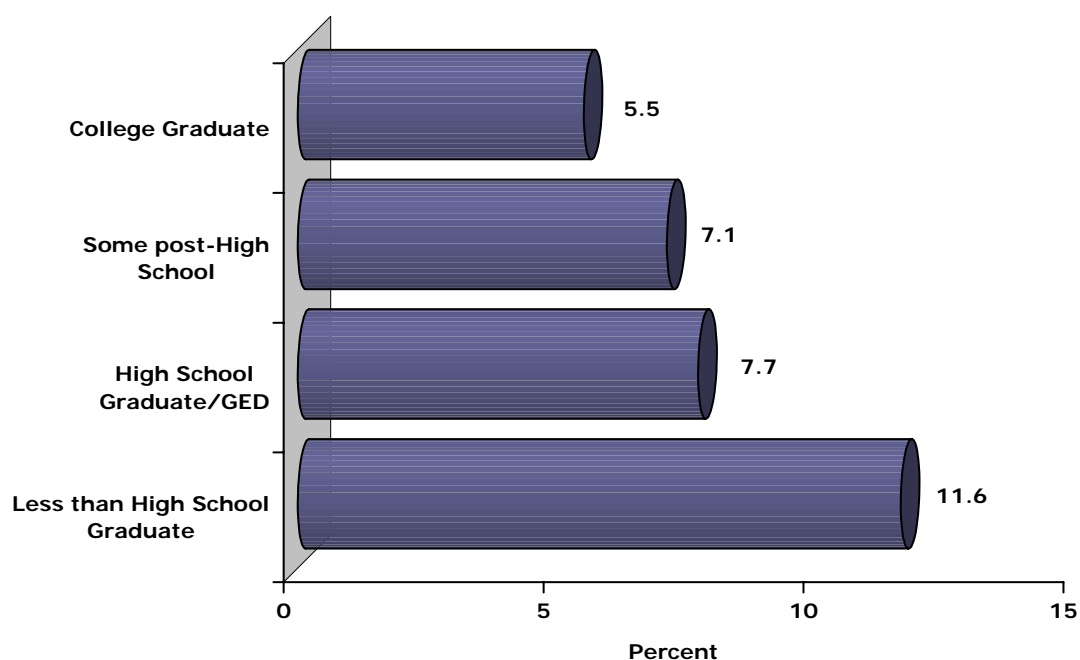
Percentages are weighted to population characteristics.  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 9 Self-Reported Prevalence of Diagnosed Diabetes by Income**  
**Indiana 1999 - 2002**  
**Source: BRFSS**



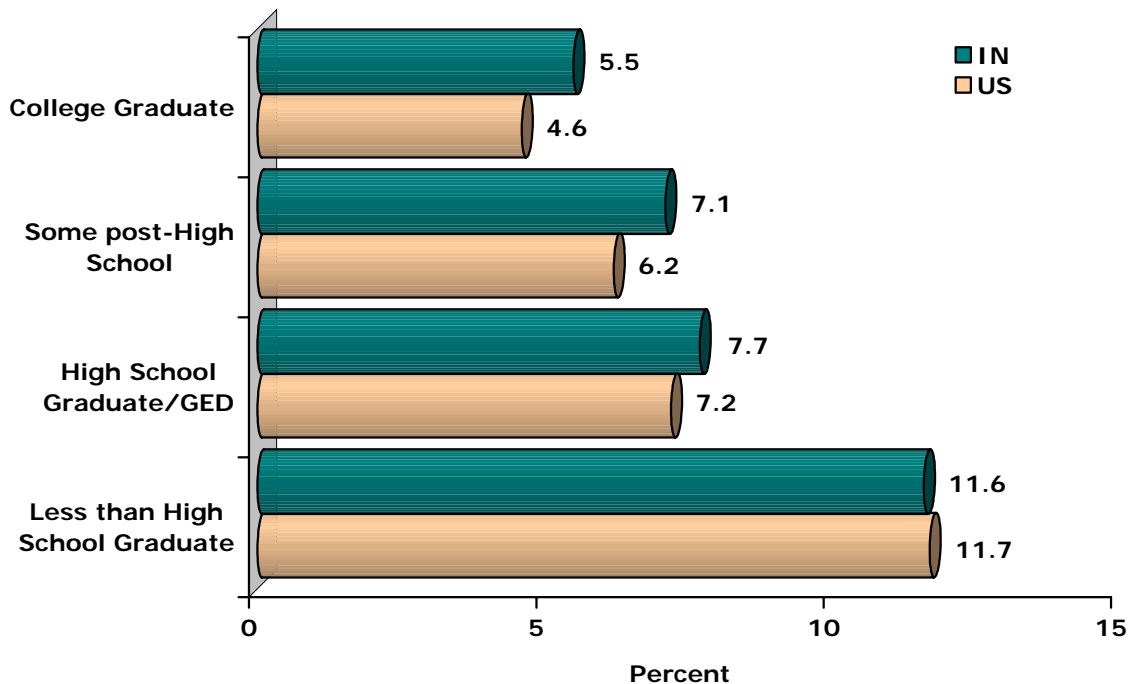
Percentages are weighted to population characteristics.  
 Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 10 Self-Reported Prevalence of Diagnosed Diabetes by Education**  
**Indiana 2002**  
**Source: BRFSS**



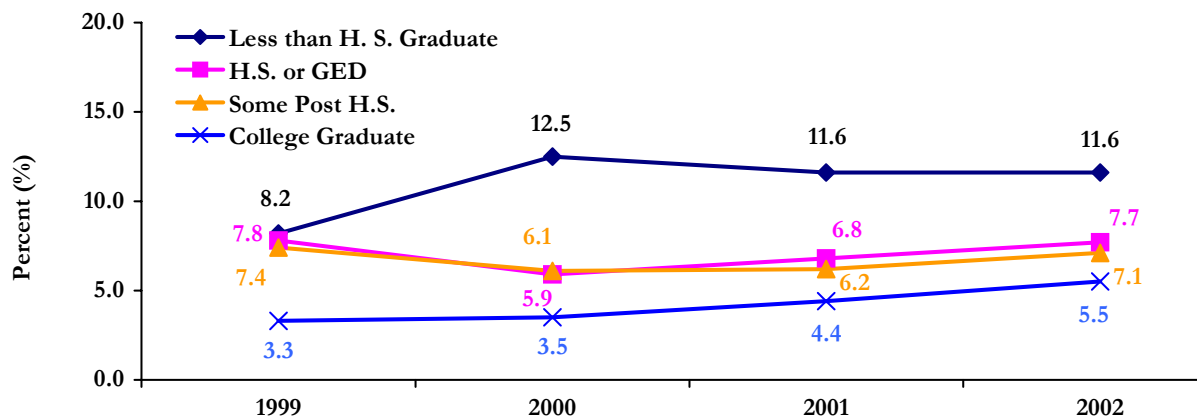
Percentages are weighted to population characteristics.  
 Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 11 Self-Reported Prevalence of Diagnosed Diabetes by Education  
Indiana vs. Nationwide Median 2002**  
*Source: BRFSS*



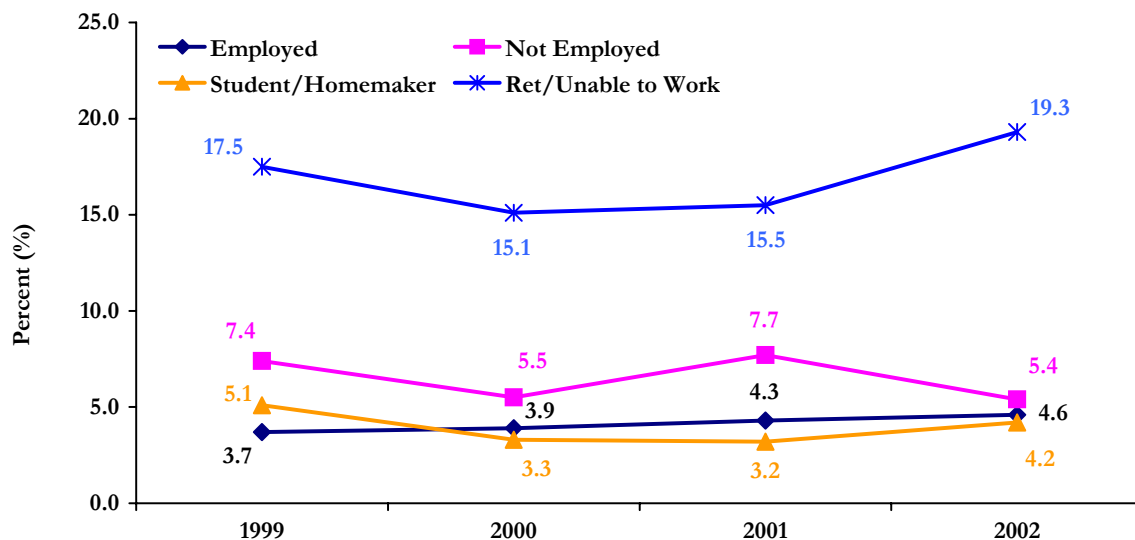
Percentages are weighted to population characteristics.  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 12 Self-Reported Prevalence of Diagnosed Diabetes by Education  
Indiana 1999 - 2002**  
*Source: BRFSS*



Percentages are weighted to population characteristics.  
Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"

**Figure 13 Self-Reported Prevalence of Diagnosed Diabetes by Employment**  
**Indiana 1999 - 2002**  
*Source: BRFSS*



*Percentages are weighted to population characteristics.  
 Respondents answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?"*

## End-Stage Renal Disease

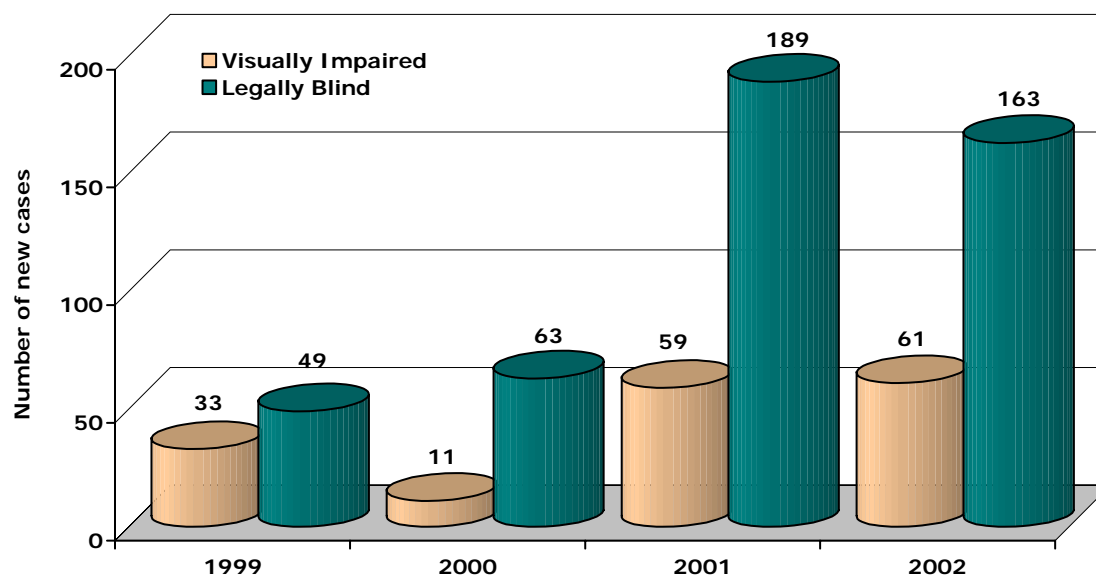
- ◆ The US Renal Data System indicates that in Indiana diabetes was responsible for 34 percent of the prevalent cases of end-stage renal disease (ESRD) in 1999 and 39 percent in 2000.
- ◆ Diabetes was responsible for 42 percent of the new cases of ESRD in Indiana in 2000.

## Diabetic Retinopathy

- ◆ Prevent Blindness America states that there are more than 112,000 cases of diabetic retinopathy in the State of Indiana, and more than 22,000 cases of blindness in Indiana adults 40 and older.
- ◆ In Indiana in 2002, there were 163 new cases of blindness in adults aged 18 or older due to diabetic retinopathy.
- ◆ In Indiana in 2002, there were 61 new cases of visual impairment in adults 18 or older due to diabetic retinopathy.



**Figure 14**      **Complications of Diabetic Retinopathy in Adults 18 and older**  
**Indiana, 1999 – 2002**



*Incidence of visual impairment and blindness among Indiana adults with diabetic retinopathy*

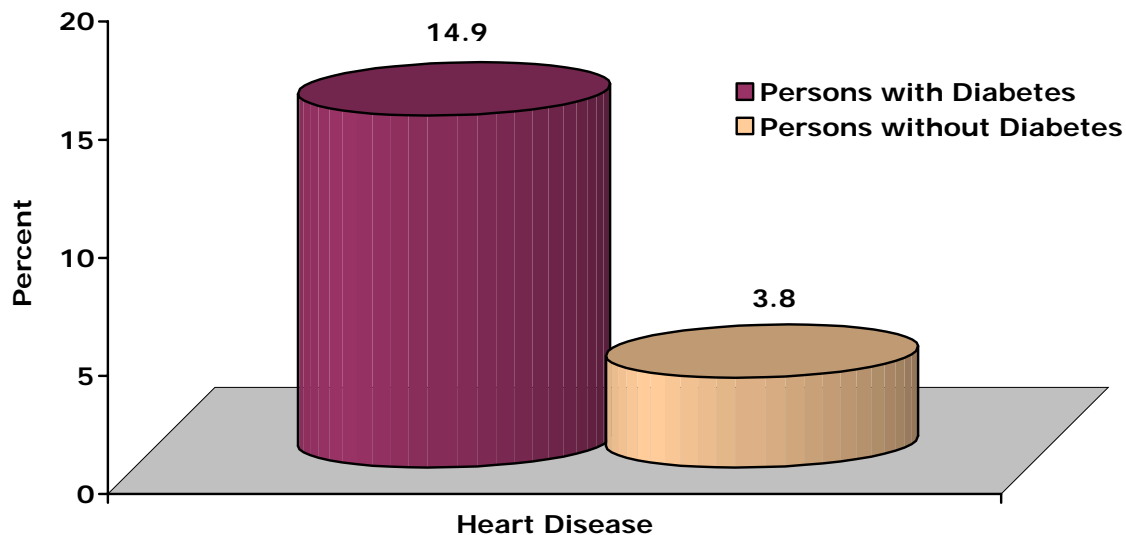
## Lower Extremity Amputations

- ◆ Based on hospital discharge information, the average number of nontraumatic lower extremity amputations (LEA) among persons with diabetes in Indiana was 1,729 for the years 1999 and 2000.
- ◆ The incidence rate of LEA for men in Indiana is one and a half times that for women.

## Heart Disease and Stroke

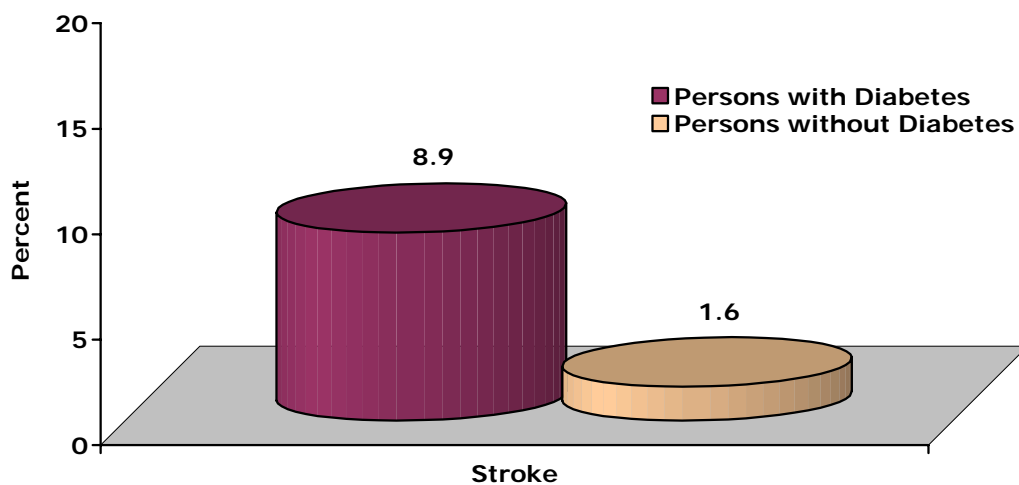
People with diabetes suffer heart attacks and strokes at a higher rate than the general population and often have worse health outcomes than people without diabetes. People with diabetes are 30 percent more likely to die after a heart attack than people without diabetes. The BRFSS survey only provides estimates of the percentage of people who have had heart disease or strokes and lived to respond to the question.

**Figure 15**      **Prevalence of Heart Disease by Diagnosed Diabetes Status**  
**Indiana 2002**  
*Source: BRFSS*



*Respondents with and without diabetes who answered "yes" to the question: "Have you ever been told by a doctor that you have heart disease?"*

**Figure 16**      **Prevalence of Stroke by Diagnosed Diabetes Status**  
**Indiana 2002**  
*Source: BRFSS*



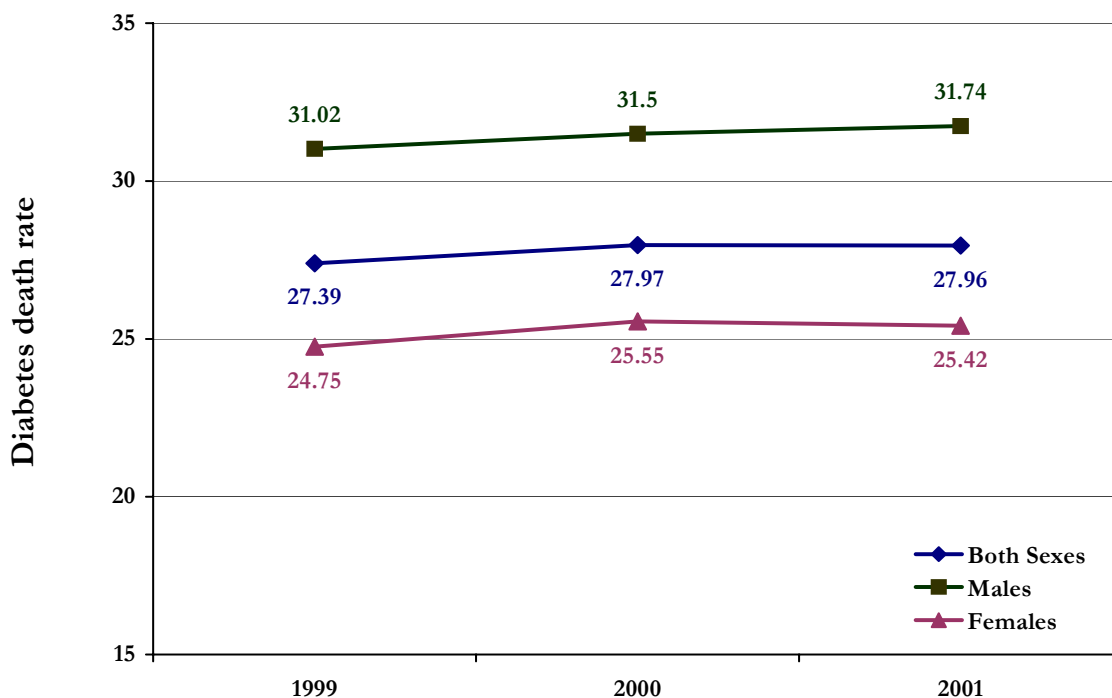
*Respondents with and without diabetes who answered "yes" to the question: "Have you ever been told by a doctor that you had a stroke?"*

## Mortality

- ◆ In Indiana, diabetes was listed as the underlying cause of 1,668 deaths in 2001, making it the 6th leading cause of death for the state.
- ◆ Based on Indiana death certificate data, diabetes is listed as the underlying or contributing cause of nearly 5,000 deaths annually.
- ◆ The death rate for blacks with diabetes is more than twice the death rate for whites with diabetes.
- ◆ Diabetes was the 5th leading cause of death for all women in Indiana and the 4th leading cause of death for black women.
- ◆ Although the mortality rate from diabetes is higher for men than for women, more women than men in Indiana die of diabetes or its complications. This is true because there are more women than men, especially in the higher age groups where diabetes prevalence is highest.

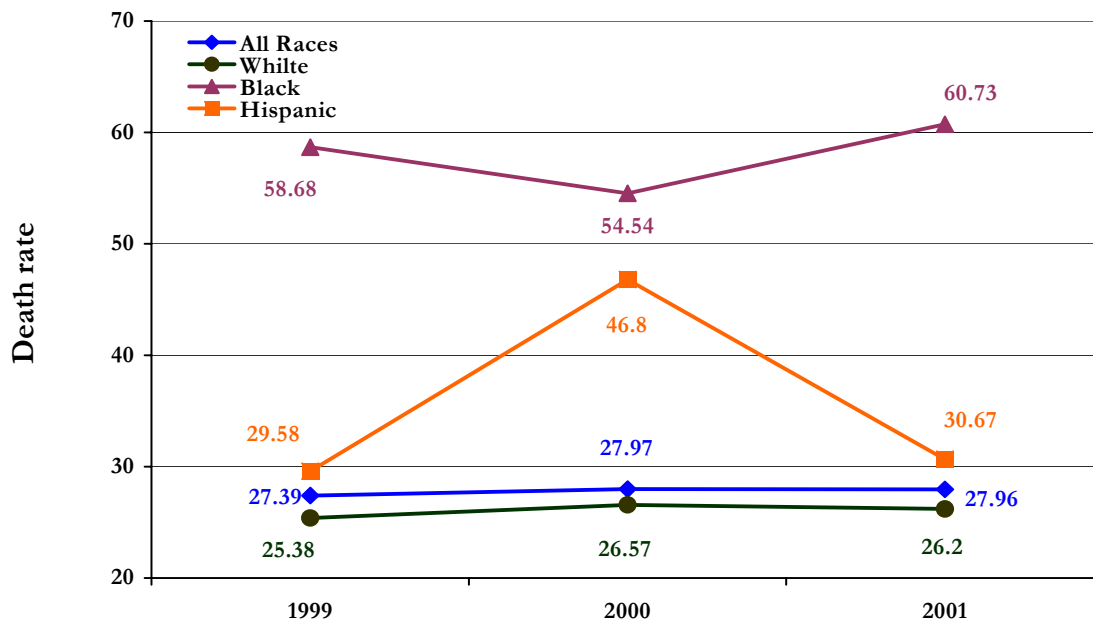
Figure 17 Indiana Diabetes Mortality Rates by Sex, 1999 – 2001

Source: Indiana State Department of Health



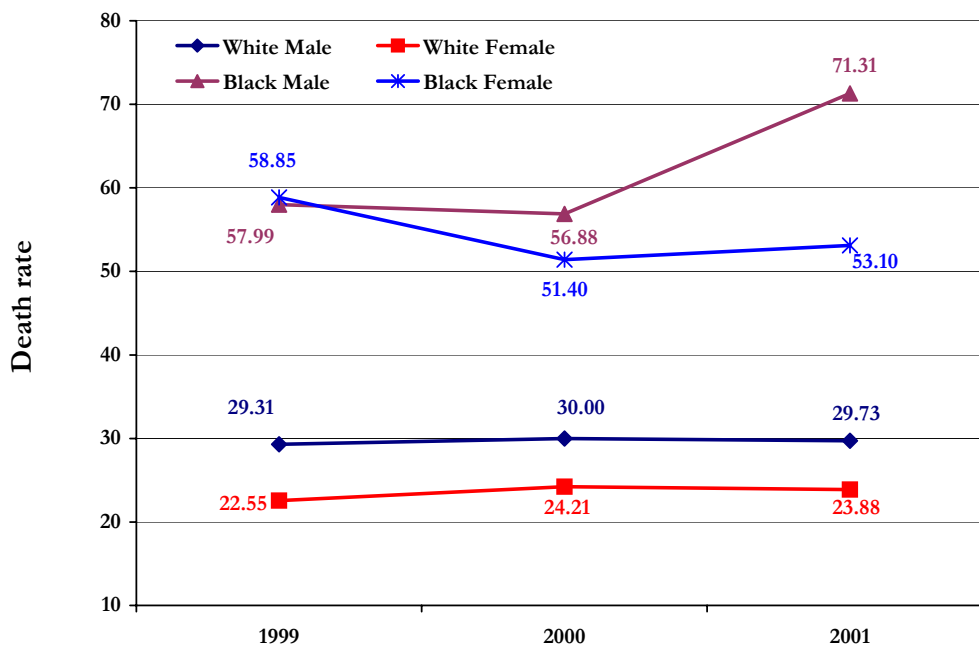
Note: Rates are per 100,000 population and age-adjusted to the US 2000 standard million

**Figure 18** Indiana Diabetes Mortality Rates by Race/Ethnicity, 1999 – 2001  
*Source: Indiana State Department of Health*



*Note: Rates are per 100,000 population and age-adjusted to the US 2000 standard million*

**Figure 19** Indiana Diabetes Mortality Rates by Race and Sex, 1999 – 2001  
*Source: Indiana State Department of Health*



*Note: Rates are per 100,000 population and age-adjusted to the US 2000 standard million*

# Risk Factors

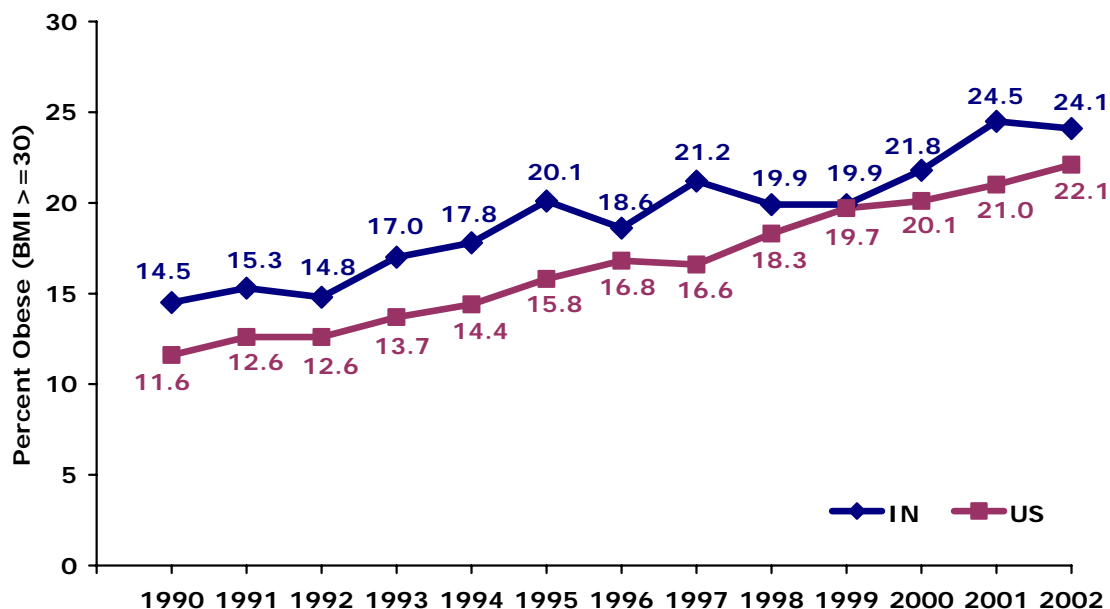
## Obesity

Obesity is a strong risk factor for the development of diabetes. There has been a growing trend toward overweight and obesity nationwide and the upward trend in Indiana is even higher than the national trend. Increasing obesity goes hand-in-hand with increasing diabetes.

Obesity in adults over age 20 is based on a Body Mass Index (BMI)  $\geq 30$ . An adult is considered overweight if he/she has a BMI measurement  $\geq 25$  and  $< 30$ , and normal weight if he/she has a BMI measurement between 18.5 and 25. BMI is calculated by a mathematical formula, which expresses the relationship of weight to height. BMI is more highly correlated with body fat than any other indicator of height and weight. The National Institutes of Health (NIH) Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults state that adults who have a BMI of 25 or more are considered at risk for premature death and disability as a consequence of overweight and obesity. The health risks continue to increase as weight gain increases. More information about BMI for adults can be found at the following website.

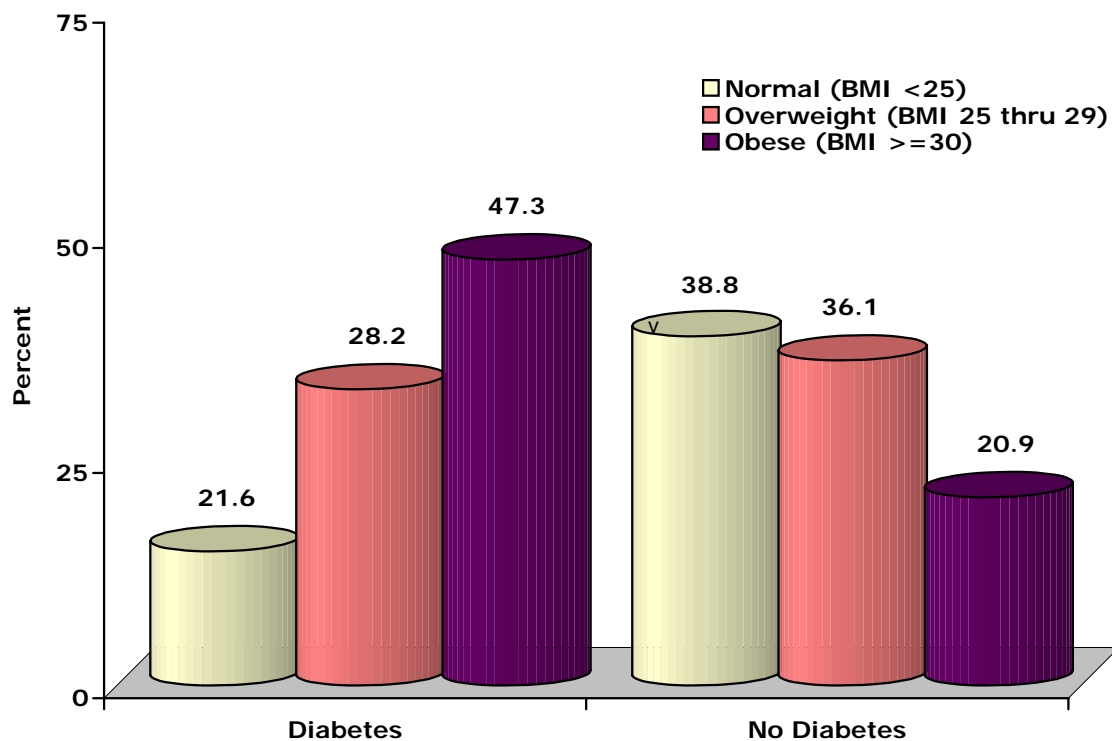
<http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult.htm>

Figure 20 Percentage of Respondents considered Obese (BMIs  $\geq 30$ )  
Indiana vs. Nationwide Median 1990 – 2002  
Source: BRFSS



- ◆ In 2002, Indiana ranked among the top 10 states in prevalence of obesity.
- ◆ Over 61 percent of adults in Indiana were either overweight or obese in 2002.
- ◆ Nearly 25 percent of Hoosiers were obese in 2002, and another 37 percent were overweight.

**Figure 21** Percent distribution of BMI category by diagnosed diabetes status.  
Indiana 2002  
*Source: BRFSS*



The method of determining whether a person is overweight or obese differs between children and adults. There is no defined category for obesity in children. BMI information is instead used to assess overweight and at risk for overweight. BMI for children is interpreted in a gender and age specific manner. BMI-for-age is plotted on gender-specific growth charts, used for children and teens from 2 – 20 years old. This is because children's body fatness changes over time as they grow and also differs between boys and girls as they mature. A child is considered overweight if he or she has a BMI measurement greater than or equal to the 95<sup>th</sup> percentile on the gender and age-specific BMI-for-age charts published by the CDC. A child is considered at risk for overweight if the BMI

measurement is greater than the 85<sup>th</sup> percentile but less than the 95<sup>th</sup> percentile on the appropriate chart. More information on BMI for children and teens can be found at the following website:

<http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm>

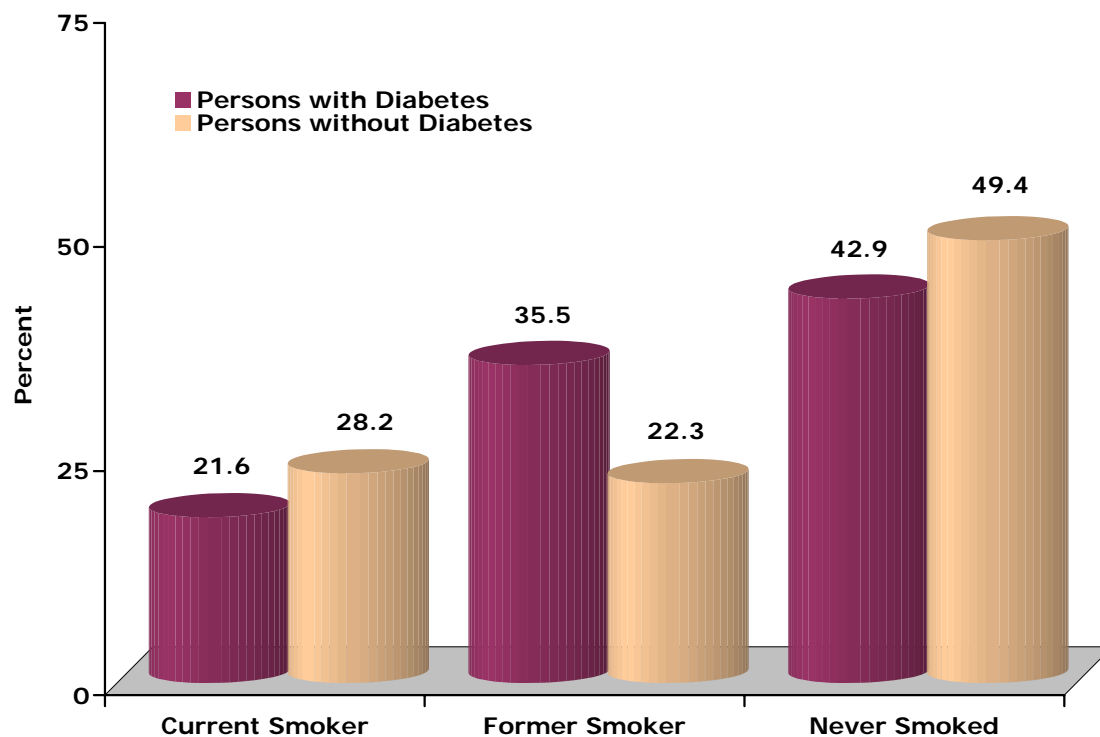
- ◆ According to the CDC, in 1971-74 the national prevalence estimate of overweight in children aged 6-11 was 4 percent. The estimated prevalence for children aged 12-19 was 6.1 percent.
- ◆ By 1999-2000, the national prevalence estimate of overweight in children aged 6-11 was 15.3 percent and children aged 12-19 was 15.5 percent.
- ◆ Indiana prevalence estimates of overweight in children in 2002 are as follows:

▪ 4 <sup>th</sup> grade boys - 19.9 percent	4 <sup>th</sup> grade girls - 19.0 percent
▪ 8 <sup>th</sup> grade boys - 23.9 percent	8 <sup>th</sup> grade girls - 19.2 percent
▪ 11 <sup>th</sup> grade boys - 21.6 percent	11 <sup>th</sup> grade girls - 14.7 percent

## Smoking

- ◆ BRFSS survey data for 2002 show that Indiana is among the 5 leading states for percentage of adults who smoke.
- ◆ BRFSS survey data indicate that a smaller percentage of people with diabetes in Indiana smoke than those without diabetes.
- ◆ People with diabetes make up a larger percentage of people who have quit smoking than people without diabetes; however, people with diabetes still make up a higher percentage of people who currently smoke than people without diabetes.

Figure 22    Percent Distribution of Smoking Status of Respondents by Diabetes Status. Indiana 2002  
*Source: BRFSS*

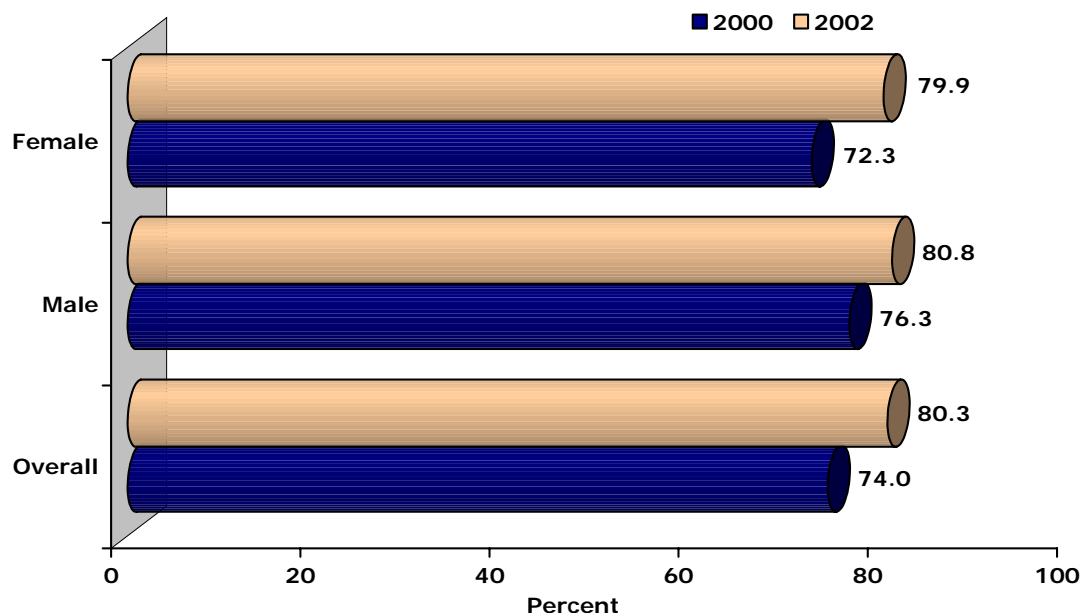


## Controlling Diabetes in Indiana

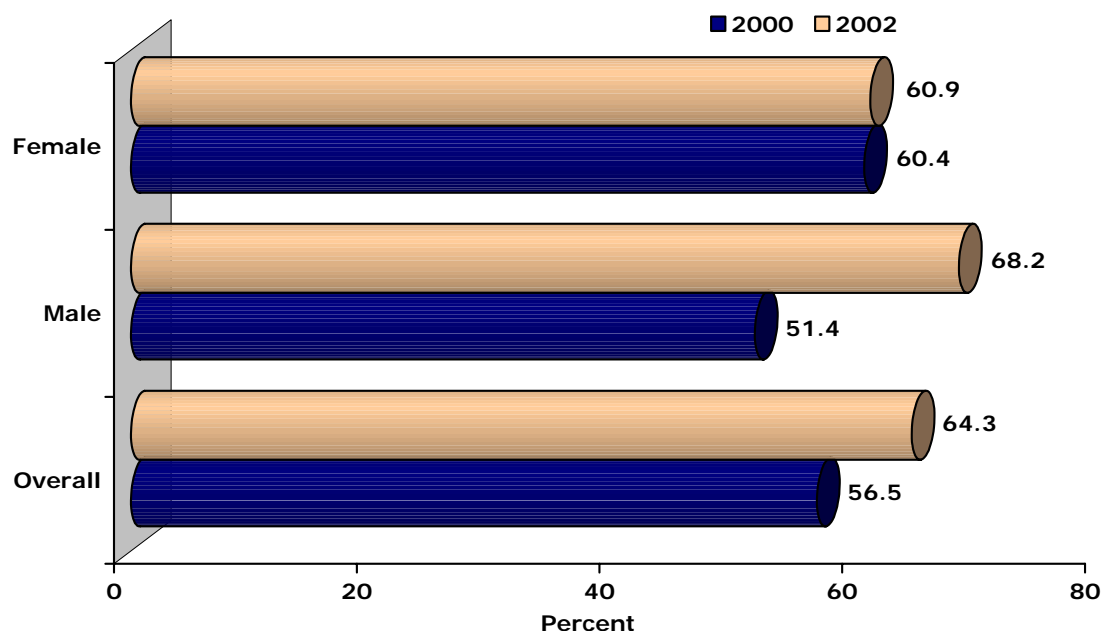
The following charts indicate self-management of diabetes care by people with diabetes in Indiana, as reported on the BRFSS. One of the goals of the Indiana Diabetes Prevention and Control Program is to increase the number of people with diabetes in Indiana who have their eyes, feet and A1C checked at least on an annual basis. The charts indicate that for the most part, there is an upward trend in these and other activities intended to help control a person's diabetes and lower their risk of complications and premature death.



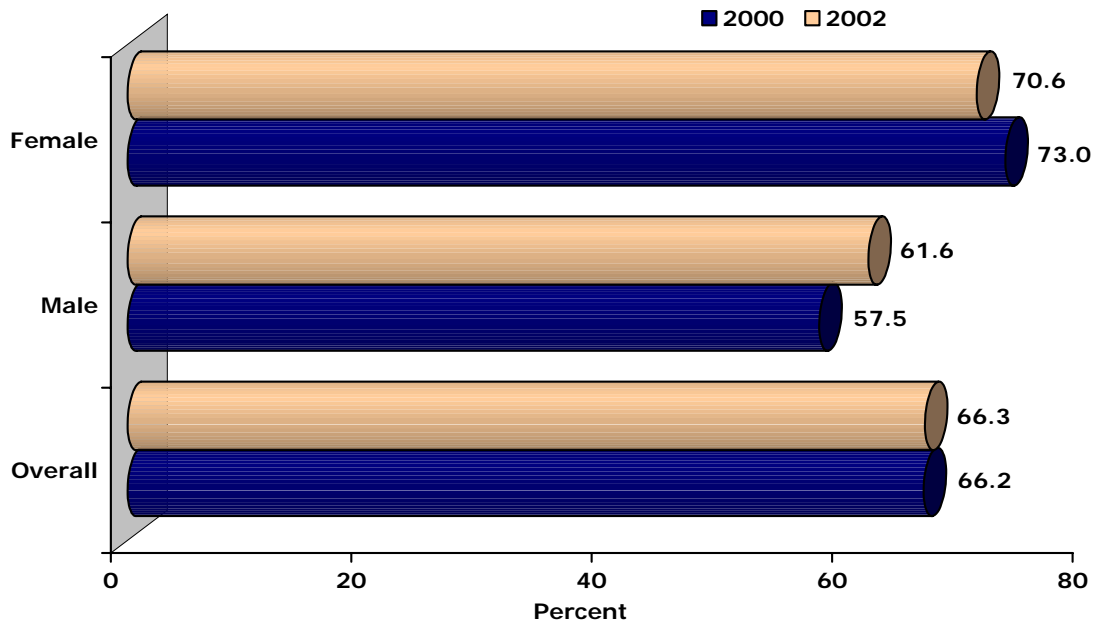
**Figure 23** Percent of respondents with diagnosed diabetes who reported they had their A1C level checked at least once during the past year, by Sex. Indiana 2000& 2002  
*Source: Indiana BRFSS*



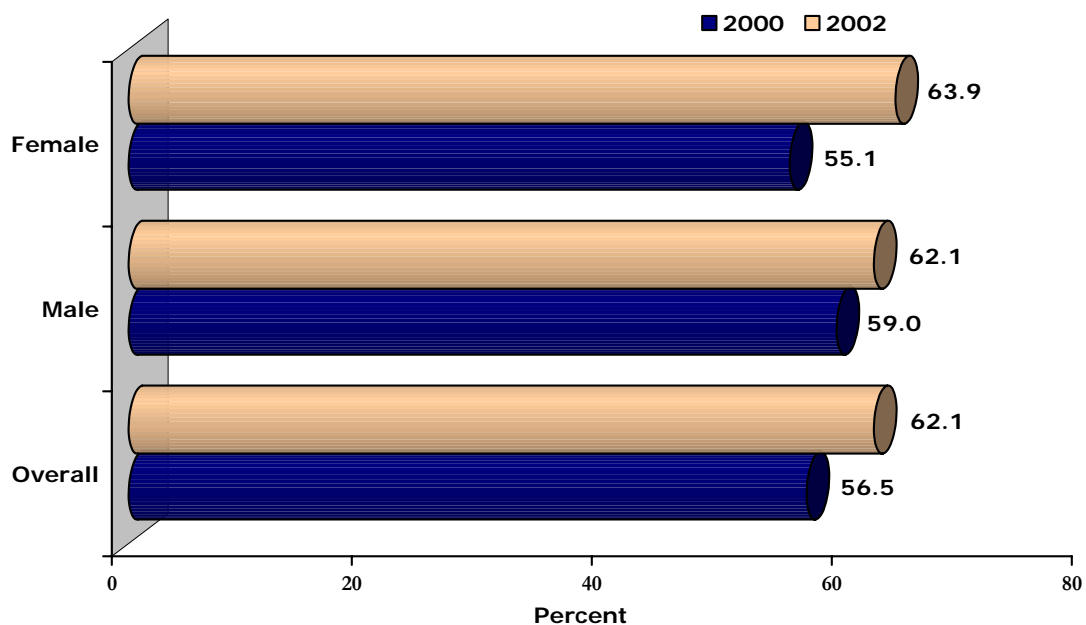
**Figure 24** Percent of respondents with diagnosed diabetes who reported they had their feet checked by a health professional at least once during the past year, by Sex. Indiana 2000& 2002  
*Source: Indiana BRFSS*



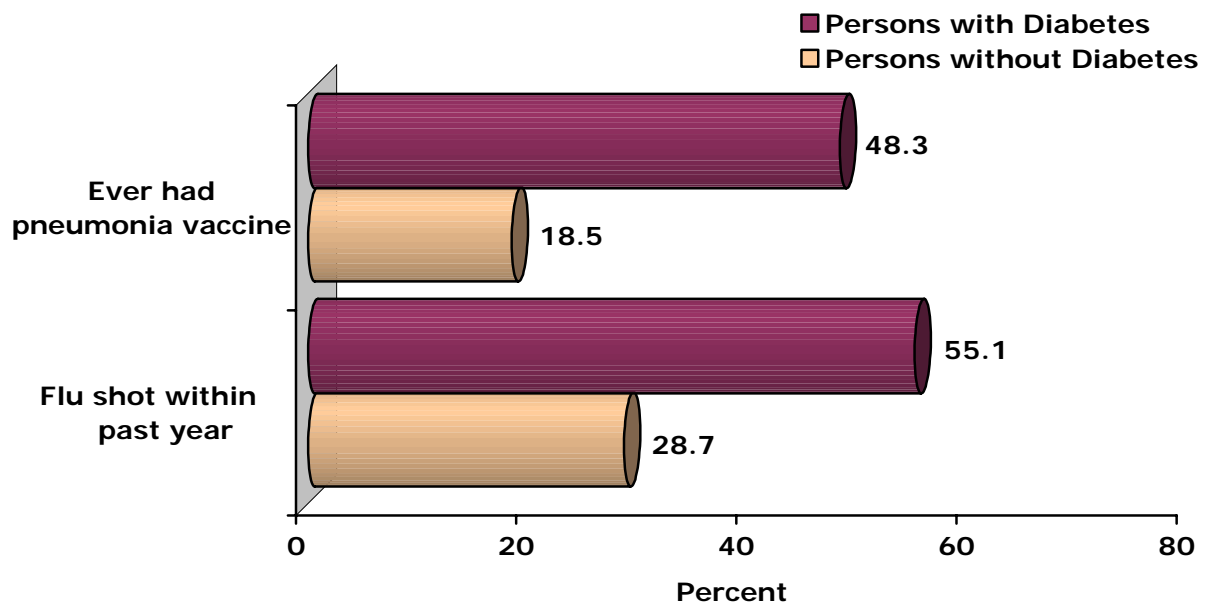
**Figure 25** Percent of respondents with diagnosed diabetes who reported they had a dilated eye exam at least once during the past year by Sex. Indiana 2000& 2002  
Source: *Indiana BRFSS*



**Figure 26** Percent of respondents with diagnosed diabetes who reported they had ever taken a diabetes self-management course or class, by Sex. Indiana 2000& 2002  
Source: *Indiana BRFSS*



**Figure 27**    Percent distribution of respondents who reported they had received a flu vaccination/pneumonia vaccination by diagnosed diabetes status. Indiana 2002  
*Source: BRFSS*



While the general trend shows that some progress has been made in increasing the number of people with diabetes in Indiana who have taken steps to manage and control their diabetes, much remains to be done to educate and encourage people to make the lifestyle choices that will reduce the incidence and prevalence of diabetes in Indiana.

Neither diabetes nor its complications are inevitable. The Indiana Diabetes Prevention and Control Program is committed to working towards reducing the burden of diabetes in Indiana, a costly disease that causes serious complications and avoidable premature deaths in the people of the state.

# Diabetes Resources

American Diabetes Association  
1701 North Beauregard Street  
Alexandria, VA 22311-1717  
1-800-342-2383 (National Headquarters)  
1-888-342-2383 (Local Offices)  
703-549-1500  
E-mail: [AskADA@diabetes.org](mailto:AskADA@diabetes.org)  
<http://www.diabetes.org>

Juvenile Diabetes Research Foundation International  
120 Wall Street  
New York, NY 10005-4001  
1-800-533-CURE (2873)  
E-mail: [info@jdrf.org](mailto:info@jdrf.org)  
<http://www.jdrf.org>

National Diabetes Information Clearinghouse  
1 Information Way  
Bethesda, MD 20892-3560  
1-800-860-8747  
301-654-3327  
E-mail: [ndic@info.niddk.nih.gov](mailto:ndic@info.niddk.nih.gov)  
<http://www.niddk.nih.gov>

Centers for Disease Control and Prevention  
<http://www.cdc.gov>  
<http://www.cdc.gov/diabetes/faqs.htm>

Indiana State Department of Health  
<http://www.in.gov/isdh/>  
<http://www.in.gov/isdh/programs/diabetes/splash.htm>  
[http://www.in.gov/isdh/dataandstats/data\\_and\\_statistics.htm](http://www.in.gov/isdh/dataandstats/data_and_statistics.htm)

National Diabetes Education Program  
<http://ndep.nih.gov/>

American Association of Diabetes Educators  
<http://www.aadenet.org/>

American Diabetes Association  
Standards of Medical Care for Patients with Diabetes Mellitus  
[http://care.diabetesjournals.org/cgi/reprint/26/suppl\\_1/s33.pdf](http://care.diabetesjournals.org/cgi/reprint/26/suppl_1/s33.pdf)

Guide to Community Preventive Services  
<http://www.cdc.gov/diabetes/projects/community.htm>

## A1C

American Diabetes Association: A1C test  
[http://www.diabetes.org/main/type1/medical/blood\\_sugar/glyc\\_hemoglobin.jsp](http://www.diabetes.org/main/type1/medical/blood_sugar/glyc_hemoglobin.jsp)

Guide to Community Preventive Services  
<http://www.cdc.gov/diabetes/projects/community.htm>

National Diabetes Education Program - Check Your Hemoglobin A1C I.Q.  
[http://www.ndep.nih.gov/diabetes/pubs/KnowNumbers\\_Eng.pdf](http://www.ndep.nih.gov/diabetes/pubs/KnowNumbers_Eng.pdf)

The National Glycohemoglobin Standardization Program  
<http://www.missouri.edu/~diabetes/ngsp.html>

Healthy People 2010  
<http://www.healthypeople.gov/document/HTML/Volume1/05Diabetes.htm>

## Aspirin Therapy

American College of Cardiology  
<http://www.acc.org/>

National Heart, Lung, and Blood Institute  
<http://www.nhlbi.nih.gov/index.htm>

## Blood Glucose

Healthy People 2010  
<http://www.healthypeople.gov/document/HTML/Volume1/05Diabetes.htm>

Take Charge of Your Diabetes (Patient education material)  
<http://www.cdc.gov/diabetes/pubs/tcyd/ktrack.htm>

## Blood Pressure/Cardiovascular Health

Hypertension Online (Baylor College of Medicine)

<http://www.hypertensiononline.org/>

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)

<http://www.nhlbi.nih.gov/guidelines/hypertension/index.htm>

American Heart Association

<http://www.s2mw.com/heartofdiabetes/diabetes.html>

Diabetes Surveillance Report, 1999

<http://www.cdc.gov/diabetes/statistics/survl99/chap1/cardio.htm>

The Link between Cardiovascular Disease and Diabetes

[http://www.ndep.nih.gov/campaigns/BeSmart/BeSmart\\_overview.htm](http://www.ndep.nih.gov/campaigns/BeSmart/BeSmart_overview.htm)

## Cholesterol

Agency for Healthcare Research and Quality - Screening for Lipid Disorders

<http://www.ahrq.gov/clinic/ajpmsuppl/lipidrr.htm>

Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Executive Summary

<http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3xsum.pdf>

Lipids Online (Baylor College of Medicine)

<http://www.lipidsonline.org/>

## Dental Exam/Oral Health

American Dental Association

[http://www.ada.org/public/topics/diabetes\\_faq.asp](http://www.ada.org/public/topics/diabetes_faq.asp)

[http://www.ada.org/prof/resources/pubs/jada/patient/patient\\_18.pdf](http://www.ada.org/prof/resources/pubs/jada/patient/patient_18.pdf)

American Diabetes Association

[http://www.diabetes.org/main/health/body\\_care/oral/default.jsp](http://www.diabetes.org/main/health/body_care/oral/default.jsp)

## Dilated Eye Exam/Eye Care

American Academy of Ophthalmology

P.O. Box 7424

San Francisco, CA 94120-7424

415-561-8500

<http://www.aaao.org>

[http://www.medem.com/MedLB/articleslb.cfm?sub\\_cat=112](http://www.medem.com/MedLB/articleslb.cfm?sub_cat=112)

American Optometric Association

243 North Lindbergh Boulevard

St. Louis, MO 63141-7851

314-991-4100

<http://www.aoa.org>

<http://www.aoanet.org/eweb/startpage.aspx?site=aoastage>

<http://www.aoanet.org/eweb/DynamicPage.aspx?site=AOAstage&WebCode=DiabeticRetinopathy>

National Eye Institute

National Institutes of Health

2020 Vision Place

Bethesda, MD 20892-3655

301-496-5248

E-mail: [2020@nei.nih.gov](mailto:2020@nei.nih.gov)

<http://www.nei.nih.gov>

<http://www.nei.nih.gov/health/diabetic/retinopathy.htm>

Prevent Blindness America

500 East Remington Road

Schaumburg, IL 60173-4557

1-800-331-2020

847-843-2020

E-mail: [info@preventblindness.org](mailto:info@preventblindness.org)

<http://www.preventblindness.org>

American Foundation for the Blind

11 Penn Plaza, Suite 300

New York, NY 10001-2006

1-800-232-5463

212-502-7600

E-mail: [afbinfo@afb.net](mailto:afbinfo@afb.net)

<http://www.afb.org>

Lighthouse International

111 East 59th Street

New York, NY 10022–1202  
1–800–334–5497  
1–800–829–0500  
212–821–9200  
212–821–9713 (TDD)  
E-mail: [info@lighthouse.org](mailto:info@lighthouse.org)  
<http://www.lighthouse.org>

National Association for Visually Handicapped  
22 West 21st Street, 6th Floor  
New York, NY 10010–6493  
212–889–3141  
<http://www.navh.org>  
Healthy Vision 2010  
<http://www.healthyvision2010.org/exams/dee.htm>

## Flu/Pneumonia Vaccinations

CDC Diabetes and Flu/Pneumococcal Campaign  
<http://www.cdc.gov/diabetes/projects/cdc-flu.htm>

Healthy People 2010  
<http://www.healthypeople.gov/document/HTML/Volume1/14Immunization.htm>

American Lung Association  
[http://www.lungusa.org/diseases/pneumonia\\_factsheet.html](http://www.lungusa.org/diseases/pneumonia_factsheet.html)

National Foundation for Infectious Diseases  
<http://www.nfid.org/factsheets/pneumofacts.html>

## Foot Care

The American Podiatric Medical Association  
<http://www.apma.org/diabetes01pub.htm>

Lower Extremity Amputation Prevention Program, Bureau of Primary Health Care  
<http://bphc.hrsa.gov/leap/>

Guide to Community Preventive Services  
<http://www.cdc.gov/diabetes/projects/community.htm>

National Diabetes Information Clearinghouse  
<http://diabetes.niddk.nih.gov/about/index.htm>



The American Podiatric Medical Association  
<http://www.apma.org/diabetes01pub.htm>

## Gestational Diabetes

CDC's Initiative on Diabetes and Women's Health  
<http://www.cdc.gov/diabetes/projects/women.htm>  
<http://www.cdc.gov/diabetes/pubs/women/index.htm>

## Obesity

American Dietetic Association  
<http://www.eatright.org/Public/>

American Heart Association  
<http://www.s2mw.com/heartofdiabetes/index.html>

National Heart, Lung, and Blood Institute  
[http://www.nhlbi.nih.gov/guidelines/obesity/ob\\_home.htm](http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm)

National Institute of Diabetes and Digestive and Kidney Diseases: Physical Activity and Weight Control  
<http://www.niddk.nih.gov/health/nutrit/pubs/physact.htm>

The Association for the Study of Obesity  
<http://aso.org.uk/>

WHO International  
<http://www.who.int/nut/#obs>

## Physical Activity

American Heart Association  
<http://www.americanheart.org/presenter.jhtml?identifier=2155>

National Heart, Lung, and Blood Institute  
[http://www.nhlbi.nih.gov/health/public/heart/obesity/lose\\_wt/phy\\_act.htm](http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/phy_act.htm)

National Institute of Diabetes and Digestive and Kidney Diseases: Physical Activity and Weight Control  
<http://www.niddk.nih.gov/health/nutrit/pubs/physact.htm>

Physical Activity and Good Nutrition: Essential Elements to Prevent Chronic Diseases and Obesity

[http://www.cdc.gov/nccdphp/aag/pdf/aag\\_dnpa2003.pdf](http://www.cdc.gov/nccdphp/aag/pdf/aag_dnpa2003.pdf)

President's Council on Physical Fitness and Sports

<http://www.fitness.gov/>

Surgeon General's Report on Physical Activity and Health

<http://www.cdc.gov/nccdphp/sgr/sgr.htm>

WHO International

<http://www.who.int/hpr/physactiv/>

Centers for Disease Control and Prevention

<http://apps.nccd.cdc.gov/brfss/>

<http://www.cdc.gov/nccdphp/dnpa/obesity/defining.htm>

<http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm>

## Smoking

Healthy People 2010

<http://www.healthypeople.gov/document/HTML/Volume2/27Tobacco.htm>

American Lung Association

<http://www.lungusa.org/>

CDC Tobacco Information and Prevention Source

<http://www.cdc.gov/tobacco/>

Surgeon General Reports on Smoking

<http://www.cdc.gov/tobacco/sgr/index.htm>

## References

The Diabetes Control and Complications Trial Research Group. (1993). The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus. New England Journal of Medicine, 329(14): 977-986.\*

Muhlestein et. al. (2003). Effect of fasting glucose levels on mortality rate in patients with and without diabetes mellitus and coronary artery disease undergoing percutaneous coronary intervention. Am Heart J, 146:351-358.

Major Cardiovascular Disease (CVD) During 1997--1999 and Major CVD Hospital Discharge Rates in 1997 Among Women with Diabetes --- United States  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5043a2.htm>

## Prevalence

Behavioral Risk Factor Surveillance System (BRFSS)  
<http://www.cdc.gov/brfss/>

Indiana State Department of Health  
[http://www.in.gov/isdh/dataandstats/data\\_and\\_statistics.htm](http://www.in.gov/isdh/dataandstats/data_and_statistics.htm)

Diabetes Surveillance System  
<http://www.cdc.gov/diabetes/statistics/index.htm>

National Institute of Diabetes and Digestive and Kidney Diseases: General Information and National Estimates on Diabetes in the US, 2000  
<http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm>

Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, Wiedmeyer HM, Byrd-Holt DD. (1998). Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in adults. The Third National Health and Nutrition Examination Survey, 1988-1994. Diabetes Care, 21: 518-524.

Cowie CC, Rust, KF, Byrd-Holt D, Eberhardt MS, Saydah S, Geiss LS, Engelgau MM, Ford ES, & Gregg EW. (2003). Prevalence of Diabetes and Impaired Fasting Glucose in Adults – United States, 1999-2000. MMWR 52(35); 833-837.  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5235a1.htm>

## Prevalence in Children

Reference Documents on Type 2 Diabetes in Children  
<http://www.cdc.gov/diabetes/projects/ref.htm>

National Diabetes Fact Sheet  
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<http://www.esrdnetworks.org/DATA.htm>

USRDS Renal Data Extraction and Reference (RenDER)  
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CDC National Center for Chronic Disease Prevention and Health Promotion  
<http://www.cdc.gov/diabetes/>

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